**Space Weather Highlights**
**23 April - 29 April 2018**

**SWPC PRF 2226**
**30 April 2018**

Solar activity was very low. The strongest event of the period was a B2/Sf from Region 2706 (N03, L=281, class/area Dao/130 on 22 Apr) on 24/2145 UTC. The region slowly decayed to plage by 28 Apr. No Earth-directed CMEs were observed in available coronagraph imagery.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit were at high levels on 23-24 Apr, normal to high levels on 25 and 28 Apr, and moderate to high levels on 26, 27 and 29 Apr. The slowly decaying elevated levels were enhanced from CH HSS activity prior to 23 Apr.

Geomagnetic field activity was mostly quiet with isolated periods of unsettled observed on 23 and 27 Apr. No notable disturbances in the solar wind were observed.

**Space Weather Outlook**
**30 April - 26 May 2018**

Solar activity is expected to continue at very low levels over the outlook period.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels on 30 Apr and 07-26 May. Normal to moderate levels are expected from 01-06 May. Enhancements in electron flux are expected due to the anticipation of multiple, recurrent CH HSSs.

Geomagnetic field activity is expected to range from quiet to G2 (moderate) geomagnetic storm levels. Quiet conditions are likely to persist until the arrival of the first of two negative polarity CH HSSs. Unsettled conditions on 06 May are likely to increase to G1 (Minor) storm levels on 07 May before decreasing to active on 08 May and finally unsettled over 09-10 May as the CH HSS wanes. Quiet conditions are then likely to persist over 11-16 May until the arrival of the second CH HSS. G2 (Moderate) storm levels likely on 17 May during the onset of the CIR ahead of the HSS. Unsettled to active conditions are likely on 18 May as total field strength decreases to around 5 nT with the HSS proper. Quiet to unsettled conditions are expected over 19 May as solar wind speeds slowly taper off. The remainder of the outlook period is expected to be mostly quiet under a nominal solar wind environment.

## *Daily Solar Data*

| Date | Radio Flux 10.7cm | Sun spot No. | Sunspot Area ($10^{-6}$ hemi.) | | X-ray Background Flux | | Flares | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | X-ray | | | Optical | | | |
| | | | | | | | C | M | X | S | 1 | 2 | 3 | 4 |
| 23 April | 74 | 22 | 80 | A4.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 24 April | 73 | 19 | 50 | A4.3 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | | |
| 25 April | 71 | 17 | 50 | A3.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 26 April | 69 | 14 | 20 | A3.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 27 April | 69 | 11 | 10 | A2.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 28 April | 70 | 0 | 0 | A2.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 29 April | 71 | 0 | 0 | A2.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |

## *Daily Particle Data*

| Date | Proton Fluence (protons/cm$^2$ -day -sr) | | | Electron Fluence (electrons/cm$^2$ -day -sr) | | |
|---|---|---|---|---|---|---|
| | >1 MeV | >10 MeV | >100 MeV | >0.6 MeV | >2MeV | >4 MeV |
| 23 April | 1.6e+06 | 1.7e+04 | 3.5e+03 | 7.3e+08 | | |
| 24 April | 2.3e+06 | 1.8e+04 | 3.7e+03 | 4.8e+08 | | |
| 25 April | 1.2e+06 | 1.7e+04 | 3.5e+03 | 1.6e+08 | | |
| 26 April | 1.2e+06 | 1.7e+04 | 3.5e+03 | 1.7e+08 | | |
| 27 April | 1.7e+06 | 1.7e+04 | 3.5e+03 | 1.2e+08 | | |
| 28 April | 6.7e+05 | 1.8e+04 | 3.5e+03 | 5.4e+07 | | |
| 29 April | 6.9e+05 | 1.8e+04 | 3.7e+03 | 5.5e+07 | | |

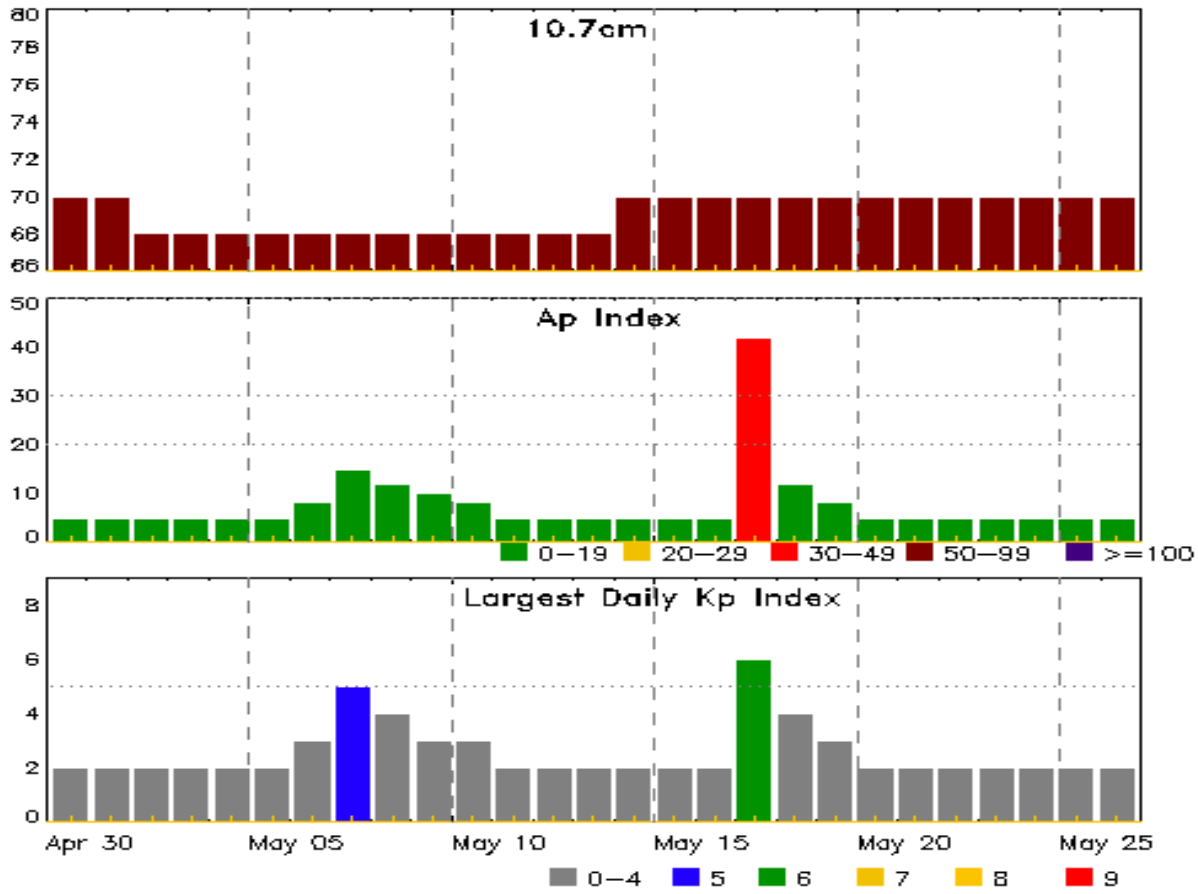
## *Daily Geomagnetic Data*

| Date | Middle Latitude Fredericksburg | | High Latitude College | | Estimated Planetary | |
|---|---|---|---|---|---|---|
| | A | K-indices | A | K-indices | A | K-indices |
| 23 April | 6 | 2-2-1-2-3-0-2-1 | 5 | 2-2-0-0-2-2-2-2 | 6 | 3-2-1-1-1-1-2-2 |
| 24 April | 4 | 1-0-2-1-2-1-1-2 | 3 | 0-0-2-0-2-1-1-1 | 5 | 1-0-2-1-2-1-2-2 |
| 25 April | 4 | 2-2-2-0-2-1-0-1 | 3 | 1-2-2-1-1-0-0-0 | 5 | 2-2-2-1-1-0-0-1 |
| 26 April | 4 | 2-1-1-1-2-0-1-1 | 4 | 1-0-0-3-2-0-1-1 | 4 | 2-1-1-1-1-0-1-2 |
| 27 April | 5 | 1-0-0-1-2-2-2-3 | 4 | 1-0-0-0-1-3-2-1 | 6 | 1-0-1-1-2-3-2-2 |
| 28 April | 5 | 2-1-1-1-2-1-2-1 | 2 | 2-1-1-1-0-0-0-0 | 4 | 2-1-1-1-1-1-1-1 |
| 29 April | 3 | 0-0-1-1-2-1-1-2 | 0 | 0-0-0-0-0-0-0-0 | 3 | 1-0-1-1-2-1-0-1 |

## *Alerts and Warnings Issued*

| Date & Time of Issue UTC | Type of Alert or Warning | Date & Time of Event UTC |
|---|---|---|
| 23 Apr 0901 | CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu | 10/1830 |
| 25 Apr 1237 | CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu | 10/1830 |
| 26 Apr 1316 | CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu | 10/1830 |
| 27 Apr 0859 | CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu | 10/1830 |
| 28 Apr 1635 | CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu | 10/1830 |
| 29 Apr 1706 | CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu | 10/1830 |

## *Twenty-seven Day Outlook*




| Date | Radio Flux 10.7cm | Planetary A Index | Largest Kp Index | Date | Radio Flux 10.7cm | Planetary A Index | Largest Kp Index |
|---|---|---|---|---|---|---|---|
| 30 Apr | 70 | 5 | 2 | 14 May | 70 | 5 | 2 |
| 01 May | 70 | 5 | 2 | 15 | 70 | 5 | 2 |
| 02 | 68 | 5 | 2 | 16 | 70 | 5 | 2 |
| 03 | 68 | 5 | 2 | 17 | 70 | 42 | 6 |
| 04 | 68 | 5 | 2 | 18 | 70 | 12 | 4 |
| 05 | 68 | 5 | 2 | 19 | 70 | 8 | 3 |
| 06 | 68 | 8 | 3 | 20 | 70 | 5 | 2 |
| 07 | 68 | 15 | 5 | 21 | 70 | 5 | 2 |
| 08 | 68 | 12 | 4 | 22 | 70 | 5 | 2 |
| 09 | 68 | 10 | 3 | 23 | 70 | 5 | 2 |
| 10 | 68 | 8 | 3 | 24 | 70 | 5 | 2 |
| 11 | 68 | 5 | 2 | 25 | 70 | 5 | 2 |
| 12 | 68 | 5 | 2 | 26 | 70 | 5 | 2 |
| 13 | 68 | 5 | 2 | | | | |

## *Energetic Events*

| | Time | | | X-ray | | Optical Information | | | Peak Radio Flux | | Sweep Freq Intensity | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | Begin | Max | Half Max | Class | Integ Flux | Imp/ Brtns | Location Lat CMD | Rgn # | 245 | 2695 | II | IV |

**No Events Observed**

## *Flare List*

| | Time | | | | Optical | | |
|---|---|---|---|---|---|---|---|
| Date | Begin | Max | End | X-ray Class | Imp/ Brtns | Location Lat CMD | Rgn # |
| 23 Apr | 1840 | 1843 | 1845 | B1.0 | | | |
| 24 Apr | 2137 | 2145 | 2152 | B2.1 | SF | N02E18 | 2706 |
| 28 Apr | 2026 | 2032 | 2046 | B1.5 | | | 2706 |

## *Region Summary*

| | Location | | Sunspot Characteristics | | | | | Flares | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Helio | Area | Extent | Spot | Spot | Mag | X-ray | | | Optical | | | | |
| Date | Lat CMD | Lon | $10^{-6}$ hemi. | (helio) | Class | Count | Class | C | M | X | S | 1 | 2 | 3 | 4 |
| | | | ***Region 2704*** | | | | | | | | | | | | |
| 12 Apr | N10E51 | 30 | 30 | 2 | Bxo | 3 | B | | | | | | | | |
| 13 Apr | N12E36 | 33 | 30 | 3 | Bxo | 4 | B | | | | | | | | |
| 14 Apr | N12E24 | 31 | 10 | | Axx | 1 | A | | | | | | | | |
| 15 Apr | N12E10 | 33 | plage | | | | | | | | | | | | |
| 16 Apr | N12W04 | 33 | plage | | | | | | | | | | | | |
| 17 Apr | N12W18 | 34 | plage | | | | | | | | | | | | |
| 18 Apr | N12W32 | 35 | plage | | | | | | | | | | | | |
| 19 Apr | N12W46 | 35 | plage | | | | | | | | | | | | |
| 20 Apr | N12W60 | 36 | plage | | | | | | | | | | | | |
| 21 Apr | N12W74 | 37 | plage | | | | | | | | | | | | |
| 22 Apr | N12W88 | 38 | plage | | | | | | | | | | | | |
| | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Crossed West Limb.
Absolute heliographic longitude: 33

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ***Region 2706*** | | | | | | | | | | | | |
| 19 Apr | N04E68 | 281 | 20 | 2 | Bxo | 4 | B | | | | | | | | |
| 20 Apr | N04E56 | 280 | 40 | 7 | Cao | 4 | B | | | | 1 | | | | |
| 21 Apr | N04E43 | 280 | 110 | 8 | Dao | 13 | B | | | | 1 | | | | |
| 22 Apr | N03E29 | 281 | 130 | 9 | Dao | 10 | B | | | | | | | | |
| 23 Apr | N02E16 | 281 | 80 | 8 | Cao | 12 | B | | | | | | | | |
| 24 Apr | N02E01 | 283 | 50 | 7 | Cao | 9 | B | | | | 1 | | | | |
| 25 Apr | N03W10 | 280 | 50 | 8 | Cro | 7 | B | | | | | | | | |
| 26 Apr | N03W27 | 284 | 20 | 1 | Hrx | 4 | A | | | | | | | | |
| 27 Apr | N03W40 | 284 | 10 | 1 | Axx | 1 | A | | | | | | | | |
| 28 Apr | N03W53 | 284 | plage | | | | | | | | | | | | |
| 29 Apr | N03W67 | 285 | plage | | | | | | | | | | | | |
| | | | | | | | | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |

Still on Disk.
Absolute heliographic longitude: 283

## *Region Summary - continued*

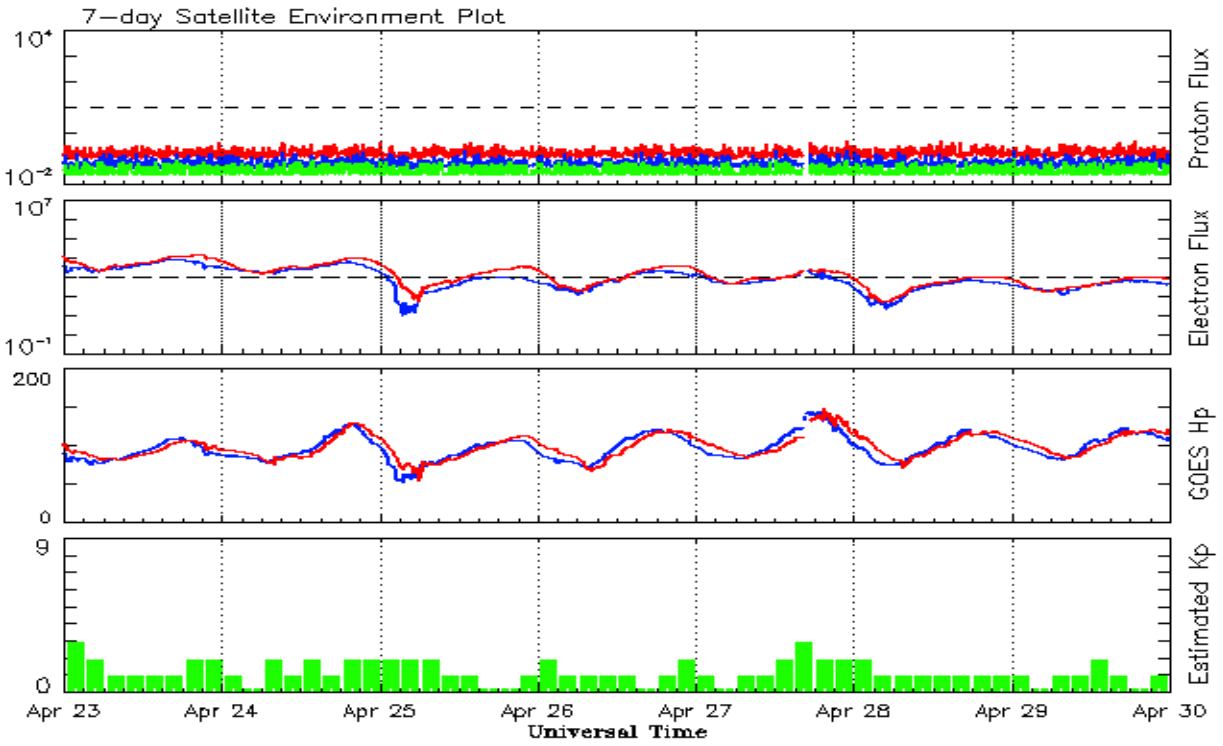
| | Location | | Sunspot Characteristics | | | | | Flares | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Helio | Area | Extent | Spot | Spot | Mag | X-ray | | | Optical | | | | |
| Date | Lat CMD | Lon | $10^{-6}$ hemi. | (helio) | Class | Count | Class | C | M | X | S | 1 | 2 | 3 | 4 |
| | | ***Region 2707*** | | | | | | | | | | | | | |
| 21 Apr | S10E29 | 294 | 10 | | Axx | 1 | A | | | | | | | | |
| 22 Apr | S10E15 | 295 | plage | | | | | | | | | | | | |
| 23 Apr | S10E01 | 296 | plage | | | | | | | | | | | | |
| 24 Apr | S10W13 | 297 | plage | | | | | | | | | | | | |
| 25 Apr | S10W27 | 297 | plage | | | | | | | | | | | | |
| 26 Apr | S10W41 | 298 | plage | | | | | | | | | | | | |
| 27 Apr | S10W54 | 298 | plage | | | | | | | | | | | | |
| 28 Apr | S10W67 | 298 | plage | | | | | | | | | | | | |
| 29 Apr | S10W81 | 299 | plage | | | | | | | | | | | | |
| | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Still on Disk.
Absolute heliographic longitude: 296

## *Recent Solar Indices (preliminary)*
## *Observed monthly mean values*

| | Sunspot Numbers | | | | | Radio Flux | | Geomagnetic | |
|---|---|---|---|---|---|---|---|---|---|
| | Observed values | | Ratio | Smooth values | | Penticton | Smooth | Planetary | Smooth |
| Month | SEC | RI | RI/SEC | SEC | RI | 10.7 cm | Value | Ap | Value |
| | | | | ***2016*** | | | | | |
| April | 39.2 | 22.7 | 0.58 | 45.0 | 28.7 | 93.4 | 95.3 | 10 | 11.8 |
| May | 48.9 | 30.9 | 0.64 | 42.1 | 26.9 | 93.1 | 93.2 | 12 | 11.7 |
| June | 19.3 | 12.3 | 0.65 | 39.0 | 24.9 | 81.9 | 90.4 | 9 | 11.4 |
| July | 36.8 | 19.4 | 0.53 | 36.5 | 23.1 | 85.9 | 87.7 | 10 | 11.2 |
| August | 50.4 | 30.1 | 0.60 | 34.2 | 21.6 | 85.0 | 85.5 | 10 | 11.2 |
| September | 37.4 | 26.8 | 0.72 | 32.1 | 19.9 | 87.8 | 83.7 | 16 | 11.3 |
| October | 30.0 | 20.0 | 0.67 | 31.1 | 18.9 | 86.1 | 82.5 | 16 | 11.6 |
| November | 22.4 | 12.8 | 0.57 | 29.4 | 17.9 | 78.7 | 81.1 | 10 | 11.6 |
| December | 17.6 | 11.1 | 0.64 | 28.1 | 17.1 | 75.1 | 80.0 | 10 | 11.4 |
| | | | | ***2017*** | | | | | |
| January | 28.1 | 15.7 | 0.55 | 27.3 | 16.7 | 77.4 | 79.4 | 10 | 11.3 |
| February | 22.0 | 15.8 | 0.71 | 25.5 | 15.9 | 76.9 | 78.7 | 10 | 11.3 |
| March | 25.4 | 10.6 | 0.42 | 24.6 | 15.4 | 74.6 | 78.6 | 15 | 11.5 |
| April | 30.4 | 19.4 | 0.64 | 24.3 | 14.9 | 80.9 | 78.4 | 13 | 11.5 |
| May | 18.1 | 11.3 | 0.62 | 23.1 | 14.0 | 73.5 | 77.7 | 9 | 11.3 |
| June | 18.0 | 11.5 | 0.64 | 22.0 | 13.3 | 74.8 | 77.3 | 7 | 11.3 |
| July | 18.8 | 10.7 | 0.59 | 20.8 | 12.6 | 77.7 | 76.8 | 9 | 11.0 |
| August | 25.0 | 19.6 | 0.80 | 19.7 | 11.7 | 77.9 | 76.3 | 12 | 10.7 |
| September | 42.2 | 26.2 | 0.62 | 18.6 | 10.9 | 92.0 | 75.9 | 19 | 10.3 |
| October | 16.0 | 7.9 | 0.49 | | | 76.4 | | 11 | |
| November | 7.7 | 3.4 | 0.44 | | | 72.1 | | 11 | |
| December | 7.6 | 4.9 | 0.64 | | | 71.5 | | 8 | |
| | | | | ***2018*** | | | | | |
| January | 7.8 | 4.0 | 0.51 | | | 70.0 | | 6 | |
| February | 16.0 | 6.4 | 0.40 | | | 72.0 | | 7 | |
| March | 6.0 | 1.5 | 0.25 | | | 68.4 | | 8 | |

**Note:** Values are final except for the most recent 6 months which are considered preliminary. Cycle 24 started in Dec 2008 with an RI=1.7.




*Weekly Geosynchronous Satellite Environment Summary*
*Week Beginning 23 April 2018*

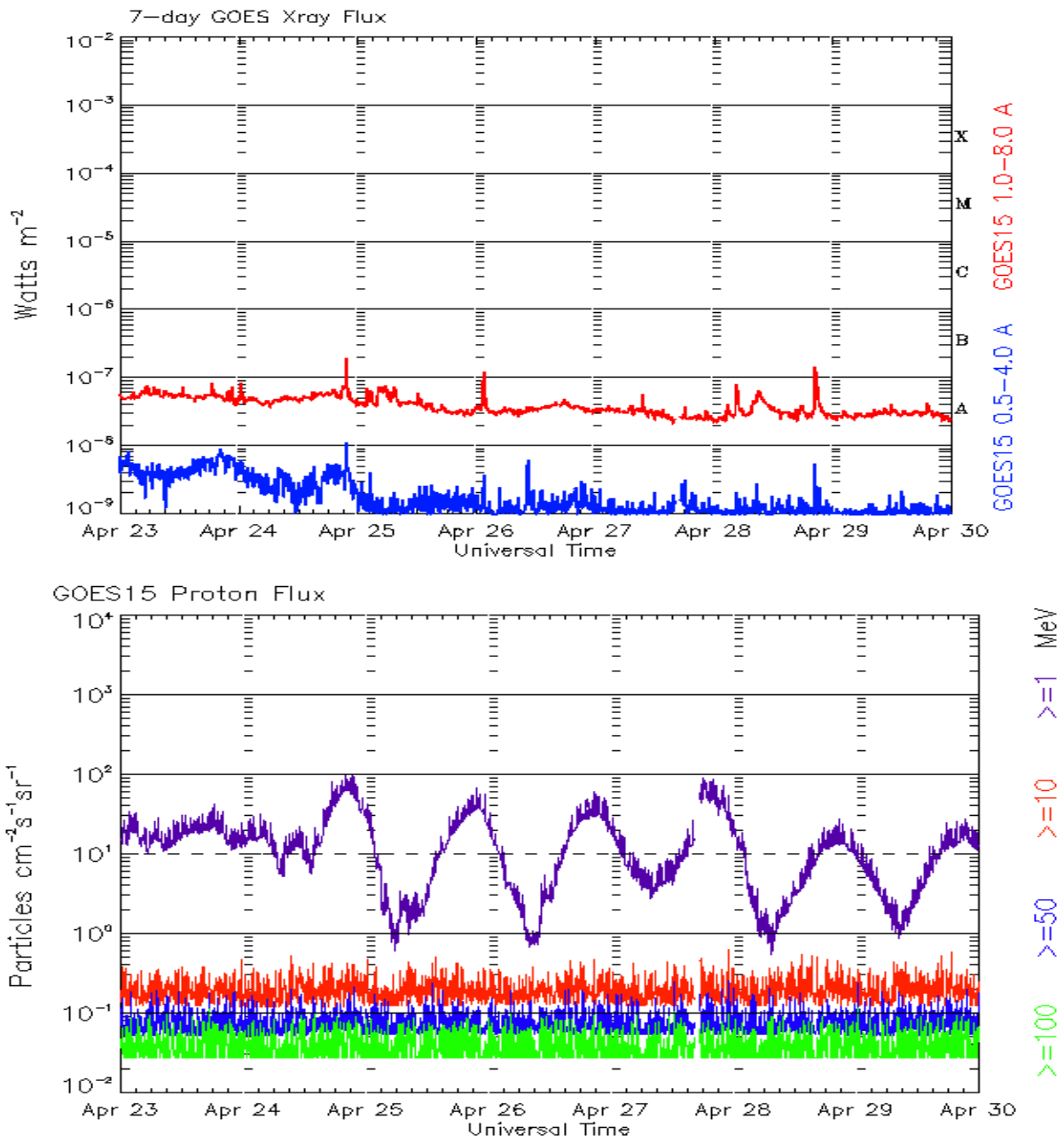
The proton flux plot contains the five-minute averaged integral proton flux (protons/cm$^2$-sec -sr) as measured by the SWPC Primary GOES satellite, near West 75, for each of three energy thresholds: greater than 10, 50, and 100 MeV.

The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm$^2$-sec -sr) with energies greater than 2 MeV by the SWPC Primary GOES satellite.

The Hp plot contains the five minute averaged Hp magnetic field component in nanoteslas (nT) as by the SWPC Primary GOES satellite. The Hp component is parallel to the spin axis of the satellite, which is nearly parallel to the Earth's rotation axis.

The Estimated 3-hour Planetary Kp-index is derived at the NOAA Space Weather Prediction Center using data from the following ground-based magnetometers: Boulder, Colorado; Chambon la Foret, France; Fredericksburg, Virginia; Fresno, California; Hartland, UK; Newport, Washington; Sitka, Alaska. These data are made available thanks to the cooperative efforts between SWPC and data providers around the world, which currently includes the U.S. Geological Survey, the British Geological Survey, and the Institut de Physique du Globe de Paris.

The data included here are those now available in real time at the SWPC and are incomplete in that they do not include the full set of parameters and energy ranges known to cause satellite operating anomalies. The proton and electron fluxes and Kp are 'global' parameters that are applicable to a first order approximation over large areas. H parallel is subject to more localized phenomena and the measurements generally are applicable to within a few degrees of longitude of the measuring satellite.




*Weekly GOES Satellite X-ray and Proton Plots*
*Week Beginning 23 April 2018*

The x-ray plots contains five-minute averages x-ray flux (Watt/m$^2$) as measure by the SWPC primary GOES X-ray satellite, usually at West 105 longitude, in two wavelength bands, 0.05 - 0.4 and 0.1 - 0.8 nm. The letters A, B, C, M and X refer to x-ray event levels for the 0.1 - 0.8 nm band.

The proton plot contains the five-minute averaged intergral flux units (pfu = protons/cm$^2$ -sec -sr) as measured by the primary SWPC GOES Proton satellite for each of the energy thresholds: >1, >10, >30, and >100 MeV. The P10 event threshold is 10 pfu at greater than 10 MeV.

## *Preliminary Report and Forecast of Solar Geophysical Data (The Weekly)*

Published every Monday by the Space Weather Prediction Center.

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NOAA / National Weather Service
Space Weather Prediction Center
325 Broadway, Boulder CO 80305

**Notice:** The 27-day Outlook, Satellite Environment, X-ray and Proton plots have been redesigned. Comments and suggestions are welcome SWPC.Webmaster@noaa.gov

The Weekly has been published continuously since 1951 and is available online since 1997.

http://spaceweather.gov/weekly/ -- Current and previous year
http://spaceweather.gov/ftpmenu/warehouse.html -- Online achive from 1997
http://spaceweather.gov/ftpmenu/ -- Some content as ascii text
http://spaceweather.gov/SolarCycle/ -- Solar Cycle Progression web site

http://spaceweather.gov/contacts.html -- Contact and Copyright information
http://spaceweather.gov/weekly/Usr_guide.pdf -- User Guide